

Acquired club hand

— Report of two cases treated with a modified Define's procedure —

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- 초 록 -

소아의 후천성 요골결손의 재건

(증 예 보 고)

문 명 상 · 전 광 남

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저자들은 후천성으로 야기된 2예의 요골간부결손에 대하여 소아에서 기대되는 척골과 그 골막에 의한 골재상을 이용하여 전박원위부에서 이분전박골(bifid one bone forearm)을 만든 결과 요골결손에 의해 생긴 손의 변형교정은 물론 그 기능 회복을 꾀할 수 있어 문헌과 함께 증예보고하였다.

이들 예에서 전골부의 근위 척골단을 손목부의 잔여요골에 옮긴 부위에서 골유합의 지연 또는 불유합을 막기 위한 골막골편 이식이 효과적임이 밝혀졌다.

* Key Words : forearm bone, acquired absence, one bone forearm surgery.

Introduction

It has been well documented that the absence of the radius, regardless of its cause leads to a radial clubhand deformity. There are considerable differences of opinion as to whether treatment of this condition is justified. Moreover, the active treatment of the acquired form of this unsightly deformity is on great clinical concern. Rather than to debate this issue, or perhaps to increase our debate on this issue, two such cases were actively and we feel successfully treated by utilizing a modification of the Define's surgical procedure.

Case 1.

A boy, two years and ten months old, on December 6th 1974 suddenly had a fever of 40° degree centigrade and pain in the right wrist, of 8 days duration, when he was first seen.

On physical examination tenderness and swelling were noted over the entire radius and the patient complained of pain of motion of the wrist and forearm. X-ray of the right forearm showed soft tissue swelling. No osseous abnormality was evident. Blood culture revealed a penicillin resistant staphylococcus aureus. Simple surgical drainage was done immediately after diagnosis and antibiotic therapy (pembritin plus cloxacillin) was

initiated. This is continued for 6 weeks. No external restraints were implemented on the infected forearm. X-ray examination on February 2nd 1975 revealed osseous destruction in the distal radial metaphysis with minimum periosteal reaction. By that time temperature was normal and pain had ceased, though drainage continued from the wound. There were no spontaneous sequestral extrusion from the infected radius. Roentgenogram 4 months after the onset of symptom revealed that most of the radial shaft had disappeared with only a minimum of new bone formation.

By June 1975, X-rays revealed that the entire shaft of the radius had disappeared completely. A gradual development of a radial deviation of the hand was noted. By this time infection was completely controlled. The child was then referred to the Orthopedic Service of St. Mary's Hospital for treatment of a severe varus deformity of the right wrist.

To correct the deformity and stabilize the wrist joint with an ultimate attainment of hand function, a modified Define's (1963) reconstructive surgery; that is, "osteotomizing the ulna at the distal metaphysis and detaching its proximal fragment from its periosteal sleeve and displacing the distal end of proximal fragment of ulna to the remaining distal fragment of radius", was carried out on November 21, 1975. The hollow ulna periosteal tube was sutured with a fine silk to keep the tube patent and to hasten the reparative osteogenesis by hematoma. Postoperative recovery was uneventful and he was sent home 6 days after surgery with an immobilizing long arm splint. X-ray of December 16th showed bone formation in the periosteal tube. X-ray of January 13th revealed complete regeneration of ulna ray by new bone. External immobilization was no longer needed; however, a long arm cast, for pro-

tection, was maintained until March 17th 1976 after which the hand was allowed free motion. X-ray of April 28th disclosed some overgrowth of ulna, reappearance of distal physis of radius and moderate hypertrophy of the ulna shaft, but hand function was excellent (Fig. 1).

Case 2.

A 5 year old boy, sustained a pedestrian traffic accident on March 18th 1977, causing a loss of the right radial shaft, severe soft tissue injuries including extensors and entire forearm skin, together with an elbow dislocation (Fig. 2). Wound debridement was done soon after admission, followed by skin graft. Six weeks after injury, the wound was completely covered with grafted skin and infection was controlled. Transplantation of ulna to radius was performed on June 8th 1977, in the same manner as is described in case 1 of this report.

X-ray of the forearm, taken in July 6th 1977, 4 weeks after surgery showed new bone formation in the ulna periosteal tube, and complete reformation of ulna ray by 3 months after surgery. On September 1, 1977 open reduction of subluxated right elbow was done. Hypertrophy of the ulna was seen 6 months later at which time the boy demonstrated almost normal right hand function with stable wrist. On January 5th 1979 the boy returned to outpatient clinic complaining of instability of the right wrist with degradation of right hand function.

X-ray of the right wrist taken on that day disclosed pseudarthrosis at the metaphysis of the radial ray. For this a periosteocortical graft was performed on January 10th 1979, grafting from his right tibia.

X-ray of right forearm taken on March 10, 2 months later, disclosed solid union. Follow-up continued until September 30th 1979 at which time normal hand function had been restored and

A-P view

Lat view

CASE 1.	I-1	I-2	I-3	I-4
M. 3	Pre op	Post op	Post op 1 month	Post op 6 months

Fig. 1.

no wrist deformity noted (Fig. 2).

Discussion

Pulvertaft (1973) states that the ideal treatment for congenital absence of radius is the correction and freedom splintage at an early age in order to enable the child to develop a functional pattern of the hand.^[8] The correction should be complete and permanent without disturbance of growth

and loss of wrist movement. Unfortunately, to date this ideal has not been achieved. Surgical methods thus far described also fall short of this ideal in one way or another.

Many forms of surgery have been practiced for congenital absence of the radius. However, definitive methods for such cases have yet to be introduced^[2, 3, 4, 5, 6, 9] Through clinical experience the author modified the Define's operation and applied it to two such cases. Before surgery

A-P view

Lat view

CASE II.	I-1	I-2	I-3	I-4	I-5	I-6
M. 5	Pre op.	Post op.	Post op. 6 months	Post op. 18 months pseudoar- throsis	Re-op.	Report op. 6 months

Fig. 2.

he was confident that bone would form in the periosteal tube of the ulna regardless of whether osteogenetic properties of the tube were due to the epiosteal layer or to the inherent capacity of well vascularized periosteum^[7, 8]. For Bosworth (1966) mentioned one could expect the complete regeneration of the lost segment after tibial diaphysectomy by periosteal flap in children prior to 8 years of age. Moreover, Moon and Kim

(1971) experienced a case of chronic osteomyelitis of the tibia in an adult which was treated by tibial diaphysectomy. In this case regeneration of the lost segment was complete by periosteal osteogenesis.

Surgical technique which includes closure of the incised periosteal tube with silk, together with external immobilization, is thought to provide a successful end result. The author

believes that external immobilization of the involved part, for a certain period of time, plays a key role in periosteal osteogenesis, and stresses its importance.

Pseudoarthrosis may develop at the radial ray, as in case 2, due to the deficiency of periosteum; therefore, the periosteocortical graft seems to be desirable at the time of transpositioning of the distal ulna to the remaining metaphysis in order to obtain a normal bony union.

Expected longitudinal growth of the radial ray by the remaining distal radial epiphysis did not occur in the first case during the period observed. If the distal radial epiphysis does not continue to grow, then the initial promise of success of surgery in the case may not be sustained. However, whether the radial ray will continue to grow or not is of course of academic concern; however, our main consideration as practitioner is to provide as fully a functioning entity as possible. The procedure described in this report appears to fulfill this objective.

Summary

Two cases are presented of acquired club hand, due to the absence of the radial shaft, which were successfully treated by a modified Define's procedure. This simple reconstructive surgical procedure is considered to be an effective method of treatment, as it does increase the function as well as the appearance of the hand.

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